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BACKUP

# 1984 END-USER PLANNING REPORT

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I

# I INTRODUCTION

- This report is part of Input's Information Systems Program (ISP). It is designed to help IS, users, and corporate management understand the changes caused by the end-user~~'s~~ revolution. It will do this by:

  - Analyzing new end-user products and systems.

  - Describing the impact of end-user computing on the organization.

  - Identifying strategies for supporting end-user computing and maximizing its benefits.

## A. REASONS FOR PREPARING THIS REPORT

- Is end-user computing of strategic importance to the organization, or is it just a high-priced, vendor marketing ruse? The rampant spread of microcomputers throughout the organization has trumpeted the start of the end-user revolution. Senior management is becoming keenly aware of the cost involved in funding this revolution, and they are not certain that it the price is worth ~~it~~. They will be looking to IS for the answers. They will also be ~~looking~~ turning to IS both for control and ~~also to~~ for the manage-ment of end-user computing from the corporate viewpoint. If IS is not up to this assignment, senior management will find ~~some~~ organization ~~who~~ that is.

o ~~The~~ end users are ~~is~~ now realizing that they cannot go it alone. They need IS's technical expertise, and they are demanding the use of the corporate data ~~which~~ that IS controls.

o IS cannot afford to ignore end-user computing, since it ~~It~~ is very visible and potentially ~~very~~ important to the success of the corporation. This report provides the foundation for IS's preparing an effective end-user strategy.

## B. SCOPE AND USE

### 1. SCOPE

o This report will focus on end-user computing from micro-based systems, through minicomputers, and including mainframe applications. Office system and information centers will also be discussed. Interfaces among micros, minis, and mainframes will be described, with an emphasis on the impact of micro-mainframe linkages. Experiences of Fortune 1000 corporations will ~~also~~ be ~~discussed.~~ treated as well.

o This report addresses the following major issues:

- What will be the impact of current and new end-user computing products?
- What is the current and projected sale of the micro in end-user computing?
- What is the vendor's role in end-user computing, and how will it change in the next three years?

- How is end-user computing support organized? What functions should be performed, and who should perform them?

- How is the relationship among users, management, and IS changing? What role does end-user computing play in this change?

- What strategies should be employed by IS to maximize end-user computing benefits?

2. USE

o This report provides:

- Guidelines for developing an end-user computing strategy.

- Compar~~e~~isons of end-user computing experiences ~~with~~ other organizations.

- Analysis of the impact of current and future end-user computing products.

o This report should be of interest to the following people:

- Senior IS Managers.

- Managers of End-User Computing.

- IS Planners.

- Senior Corporate Managers.

- End-User Managers.

  - End-User Computing Vendors.

## C. METHODOLOGY

- o The information for this report was gathered from the following sources:

  - Over 72 interviews with senior IS managers and executive users who either have installed or plan to install executive workstations. Copies of the questionnaires are contained in Appendices A and B.

  - Over 10 in-depth interviews with vendors of hardware and software products used by Executives. Appendix C contains a copy of the vendor questionnaire.

  - INPUT's own studies on end-user computing and information systems planning.

- o INPUT has taken the best practices and proposals and subjected them to further analysis to serve as the basis for this report.

## D. OTHER RELATED INPUT REPORTS

- o Interested readers are referred to the following INPUT reports:

  - Micro-to-Mainframe Systems Experiences, August 1984.

    - . Will concentrate on the experiences of organizations that use personal-computer-to-mainframe systems. It will also identify systems requirements and project future effects.

- Micro-to-Mainframe Telecommunications, August 1984.
  - Will analyze, in detail, personal computer communications modes, their advantages and limitations, and how these communications are likely to change in the next two to three years.
- 1984 Information Systems Planning Report, July 1984.
  - Identifies the budgetary plans for major information systems organizations. It also reports these companies' planning issues. The report identifies the budget and planning information for all companies, ~~and~~ by industry sector.
- Training Techniques for End Users, June 1984.
  - Describes effective techniques for training end users. It emphasizes the benefits of training and identifies suppliers and techniques.
- Executive Workstation Acceptance: Problems and Outlook, April 1984.
  - Identifies executive computing requirements, analyzes products, and recommends executive computing support strategies.
- Managing the Acceptance of Office Systems, December 1983.
  - Identifies the key factors and techniques for increasing the acceptance of office systems.

- *Impact of Office Systems on Productivity*, November 1983.
    - Establishes the framework for understanding the productivity problem and for evaluating office systems.

- *The Opportunities of Fourth-Generation Languages*, September 1983.
    - Analyzes the extent to which fourth-generation languages are used and how they fit into the information systems strategy.

- *Organizing the Information Center*, August 1983.
    - Discusses how to organize an information center, including chargeback methods.

- *Personal Computers Versus Word Processors: Resolving the Selection Dilemma*, June 1983.
    - Compares and contrasts PC and WP roles in the office environment ~~for~~ of today and the future. It also includes a methodology to assist decision makers in making cost-effective selections that reflect each organization's unique environment.

- *The Impact of the Office of the Future*, December 1980.
    - Describes the expected effects of the "office of the future" on both the organization and the people within it.

- *Managing the Integration of Office Automation in the EDP Environment*, November 1980.
    - This report focuses on the tactical issues involved in managing the integration of office automation ~~into~~ with the organization.

## E. REPORT ORGANIZATION

- The remainder of the report is organized as follows:
  - Chapter II is an Executive Summary.
  - Chapter III describes the end user and ~~its~~ impact on the organization.
  - Chapter IV describes the vendors' view of end-users needs and describes ~~their~~ the vendor's role in end-user computing.
  - Chapter V discusses end-user planning issues and strategies.
  - Chapter VI contains Conclusions and Recommendations.
  - Appendix A is a copy of the End-User Questionnaire for IS Executives.
  - Appendix B is a copy of the End-User Questionnaire for Vendors.

II

Please conform to Executive Summary format: 1 pg text per 1 Ex.

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## II EXECUTIVE SUMMARY

- This Executive Summary is ~~designed~~ given in presentation format to help the busy reader quickly review key research findings. It ~~will~~ also provides an executive presentation, complete with scripts to facilitate group communications.

  - The key points of the entire report are summarized in Exhibits II-I through II-7. On the left-hand page facing each exhibit is a script explaining that exhibit's contents. II-1 – II-7

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## A. ~~IT~~ I.S. SHOULD ACT AS A FACILITATOR OF END-USER COMPUTING

- ~~It~~ IS can take a leadership role in end-user computing by acting as a facilitator. IS technical expertise can aid ~~the~~ users in solving many of their ~~own~~ computing problems. In addition, IS can enhance its image with the user by being an ally rather than a user adversary. The creation of preferred equipment and software lists can provide users with some freedom of choice, ~~yet~~ while giving them the security of using technically sound products. If IS commits to supporting the preferred products, the users will usually ~~happily~~ gladly limit their computing acquisitions to those recommended by IS.

- IS can minimize its credibility problems by making realistic commitments to end users and by satisfying them on time. Both IS and senior management respondents stated that IS could best ~~improve~~ enhance its image by improving its

performance. Meeting commitments on time is the best indicator of improved performance.

- The d~~e~~iverse requirements of end-user computing translates into a high demand for service. IS is in the best position to provide this service, but it must not be under-staffed. Trainers, consultants, and programmers need to be permanently assigned. The consultants should act as account executives to the end-user community. They should be of sufficient number to be responsive to the end-user "customers."

- I~~T~~S should establish an end-user computing planning group that includes senior management and end users. This group would view end-user computing needs ~~in~~ within the context of the corporation's information requirements. A top-down approach to end-user computing is the best way to maximize its potential benefits. In most companies this is equated ~~to~~ with improved project control methods and with more frequent and comprehensive project status reporting.

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## B. THERE IS A MAJOR SHIFT TOWARDS END-USER COMPUTING

- INPUT projects that by 1990~~,~~ end-user computing will comprise 80% of all corporate computing.

    - There will also be a tremendous growth in total corporate computing. ~~With~~ Using 1970 ~~being~~ as the standard, total processing in 1980 was eight times that of 1970, and 1990 processing will be 160 times that of 1970.

    - The growth in end-user computing is mirrored by the growth in distributed processing.

        - Currently, distributed processing accounts for 20% of corporate computing.

- By 1990, INPUT projects that distributed computing will account for 55% of computer processing.

- There is also a shift from traditional, transaction processing ~~towards~~ to decision support. Currently, decision support processing accounts for 35% of total processing. In 1990, decision support will comprise 60% of all processing.

- Although end-user computing will account for 80% of 1990 processing, traditional processing will still be growing, but at a much slower rate. The transaction-oriented systems will not only run the operational and administrative segments of the operation, but they will also build the data bases that ~~will be used by~~ the end users will use.

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## C. THE END-USER COMMUNITY IS GROWING

- The end user has upward mobility. In the 1970s, end users were ~~primarily~~ largely clerical and administrative personnel using primary computerized reports. These reports were packed with data but needed to be translated into information by the users and their superiors.

- Now the end user includes professionals and managers. These users are getting directly involved with computing and are using the results to affect tactical decision making.

- By 1990, most groups within the organization will be end users. The information emanating from the computer systems will be used to make strategic decisions. These new end users ~~are~~ will be powerful. ~~They are~~ Also, they will be in the highest strata~~s~~ of the organization. Thus, end-user computing, and computing in general, will have increased visibility. This presents an opportunity for IS to increase its position as a strategic resource ~~in~~ within the organization.

## D. MICRO APPLICATIONS ARE MORE CROSS-INDUSTRY ORIENTED THAN APPLICATIONS IN GENERAL

- Non-industry specific (cross-industry) applications comprise the main use of ~~dominate~~ microcomputers.

  - The micro entered the corporate market because of the spreadsheet software.

  - As users increased their proficiency, they acquired other general-purpose systems, such as text processing, data bases, and graphics systems.

  - In the future, the users will be ~~are beginning to~~ concentrating more on file management, reporting, and communications, and less on the traditional spreadsheet and text processing. Spreadsheets and text-processing packages will still be heavily used, but they will not increase in usage as rapidly as will other applications.

- The added proficiency of micro users has now enabled ~~started~~ them to address industry-specific applications. Respondents stated that planned industry-specific micro systems will account for 29% of all applications, a slight increase over the current 23%, but still significantly behind all applications at 39%. The majority of industry-specific applications will remain the purview of the mini and mainframe computers. The micro's role~~s~~ will be to use industry-specific data for decision support purposes.

## E. MICRO-MAINFRAME APPLICATIONS WILL GROW SIGNIFICANTLY BY 1988

o INPUT forecasts that micro-mainframe applications will grow from a relatively insignificant 3.7% of all applications to ~~over~~ more than a quarter of the corporate applications. The vendors are beginning to flood the market with micro-mainframe linkages. These systems range from data extraction programs to systems that operate parallel systems on the micro and the mainframe.

o Most of the future growth for micro mainframes is being ~~caused~~ by the end user.

- The desire to access and manipulate corporate data.

- ~~They~~ End users want an interactive environment ~~emanating from~~ available on their micros as well as ~~The end user wants~~ two-way data transmission. ~~and~~ They also want to ~~actually~~ have the micro become an active part of production applications.

o IS's support of the end user's demand is cautious. The ability for the user to modify production data is being resisted. There may be a legitimate need for end-user modification of corporate information, but this must be planned and ~~contracted~~ controlled.

o The technical barriers to micro-mainframe connections are not trivial. They require:

- Multiple mainframe access.

- Multiple data base access.

- Multiple telecommunications environment.

o To overcome the technical complexities, IS must work with vendors to develop solutions.

## F. THE VENDOR IS WALKING THE TIGHTROPE

o The vendors of end-user products ~~have~~ typically dealt solely with the end user.

- IS was not interested in ~~these~~ vendors' markets of word processing, engineering, and scientific systems.

- The vendors provided more direct support to their users than did the mainframe vendors.

o The end-user vendors have added office-system software to their minicomputer products and have provided microcomputer connections to their systems. These added features, coupled with IS's growing involvement with end-user systems, ha~~s~~ve presented these vendors with two major problems.

- How to develop a rapport with IS? IS has at best ignored their existence and at wors~~e~~t resented their work relationship with end users. IS has an unstated loyalty to IBM, and IS is starting ~~appears~~ to becom~~ing~~e the decision maker on all end-user systems.

- How to court IS and yet maintain ~~their~~ excellent relations with the end user.

o Many of the vendors are proposing that the mini computer be a departmental computer. It would act as an effective intermediary between the personal processing micro and the corporate computing of the mainframe. The minicomputer vendors are selling this concept to IS and also are helping IS set up an end-user service organization~~s~~. These vendors' service strength will be used as a competitive advantage over IBM—if only IS will listen.

oℓ

## G. IS' END-USER COMPUTING STRATEGIES ARE JUST STARTING TO DEVELOP

- In the past, IS's end-user strategies were primarily reactive. IS was overburdened with a multi-year backlog of application programming and would not take the time to consider special reporting requirements of the end user. IS did establish the information center as a response to the end user's needs but, in many cases, did not provide adequate support levels.

- Currently, the micro invasion has heralded the start of the end-user revolution. The proliferation of end-user products has forced IS to become involved.

  - Senior management looked to IS's expertise to control ~~to~~ the growing expense of this equipment.

  - End users' demands have increased. They now require access to corporate data and technical assistance on their local systems.

  - IS, again, is s~~lacking~~.

- In order for IS to become proactive, it must initiate a plan for end-user comput~~er~~ing as part of the corporate computing strategy. The plan must take a corporate view of the end-user's needs. IS must build its credibility by providing a ~~well-staff~~ed high-quality support organization, and it ~~IS~~ must enter the service business if it is to be successful in the age of the end user.

- End-user computing can be the means for providing strategic, timely information to the proper people, ~~which~~ can result in a competitive advantage. Unmanaged, end-user computing can be relegated to a high-cost fad. IS can make the difference.

III

# III END-USER COMPUTING: FAD OR PHENOMENON

o End-user computing has been heralded by marketers, analysts, and end users as the first usable sign of the information revolution. Analysts are projecting that IS corporations will spend billions of dollars each ~~a~~ year on equipment, software, and services to satisfy the perceived needs of the ubiquitous end user. This chapter will ~~investigate~~ the phenomenon of end-user computing, and why it has ~~burst into~~ prominence. Further, it will examine the impact on ~~the~~ organization as a whole, and on IS in particular, and it will study how the end user is changing.

## A. THE GENESIS OF END-USER COMPUTING

o In the beginning there were computer systems that only addressed a company's operational needs. These were primarily accounting-based systems, run in a secured conclave, that received numerical information represented on special forms from accountants and clerks. ~~and~~ These systems returned reams of computer-produced reports that contained high data but were of low information value.

- The users of these reports had to be specially trained to understand the cryptic headings and the meaning of the numbers.

- These users then translated this computer output into understandable information that could be used by managers and professionals in other areas of the company.

- o Computing was expensive. It required specialists to program and operate the computer. Data, both input and output, ~~was~~ were computer oriented. It was ~~also~~ less expensive to ~~have~~ people ~~conform~~ to ~~the~~ computer's ~~requirements~~ ~~than vice versa.~~ stet

- o The technological advances in computer sciences greatly reduce~~s~~d the cost of computing and provided software that eased the task of programming.

  - Computer-based systems spread to all major functions of the organization with the advent of English & statement-type program languages (e.g., COBOL). ~~Simplified programming languages made it possible to computerized other areas of the organization such as personnel and marketing.~~

  - Report generating programs made computer output more usable.

- o Timesharing and service bureau companies initially brought computerization to organizations that could not afford their own computer ~~organization~~ function, or that wanted to augment ~~th~~ the inadequate data processing facilities.

  - Timesharers provided hardware, software, and support services.

  - Data could be either physically sent to timeshar~~e~~ing organizations or transmitted telephonically.

- o Soon the users of data were ~~using~~ utilizing timesharing organization~~'s~~s' programs to perform analysis on output from their own computers.

  - User organizations' timeshar~~e~~ing costs were rivaling data processing computer budgets.

  - Corporate computers were being used for operational purposes; timeshar~~e~~ing organizations were being used for data analysis.

  - The timesharing users were also specialists. They learned programming languages and were viewed in some companies as rivals to the data processing departments.

    - The justification for using non data processors to satisfy the organization's analysis requirements was the backlog of programming requests.

    - The priority for satisfying the analytical needs ~~were~~ was lower than that of computerizing operations applications. The backlog for these applications exceeded two people years of effort in many companies.

- The growing expense of timesharing caused a ~~growing~~ rift among users, information systems (IS), and senior management.

    - Senior managers were concerned that the company was spending over 1% of its revenues on its internal data processing organization but still had a growing expense to external timesharing organizations.

    - The user was feeling pressure to use the IS organization for computing but was not receiving the service internally that external companies provided.

    - IS was the ultimate loser. They had a growing backlog of programming requests for new systems and for modifications to existing systems. There was ~~growing~~ increasing dissastification from users who wanted operations systems implemented but who also wanted ad hoc reports based upon the data that these systems provided. ~~And~~ Also, the users needed these reports ~~now~~ and ~~these~~ systems ~~even sooner.~~ immediately; IS, however, could not satisfy these requests for months. Even when the systems were implemented, the use of the system developed new demands, ~~that~~ and these were placed at the bottom of the priority given.

- Larger companies reponded to the timeshare expense problem by creating their own timesharing organization.

- As early as 1972, some companies set up internal timesharing companies, complete with support staff and complex charge-back procedures.

- In some cases, this did not alleviate the problem because departmental costs were not reduced. The flow of dollars was ~~were~~ not going outside the company, but the departmental budget usually did not reflect this benefit. In fact, in many companies, the in-house monopoly on computing caused another scar on the IS user relationship.

o The information center concept sprang from in-house timesharing, with the aid of a not-so-gentle marketing share from IBM.

  - IBM coined the term and packaged some of its "user~~s~~ friendly" languages as the vehicle for letting ~~the~~ users help themselves.

  - IBM pushed the concept of a central facility, staffed by trainers and consultants, to provide on-site support to the user.

  - The information center became timesharing with enriched support. It also fueled the growth of fourth-generation languages that were easy to use and could satisfy most of the users' reporting and analytical needs.

  - The information center provided IBM with a golden opportunity to sell more hardware, especially mass storage devices.

o One of the biggest benefits of the information center has been that of putting IS in the service business.

  - IS has begun to work with users to solve users' ~~their own~~ problems.

  - IS has begun ~~began~~ to understand ~~to~~ the analysis requirements of the organization~~s~~

and the need to provide the proper tools to satisfy the ever-changing information ~~user~~ needs of the user.

- The user, however, has remained the specialist (e.g., financial analyst, market researcher, and inventory control officer). Managers were still receiving computer reports or reworked versions of them ~~computer reports~~.

## B. MICRO MANIA

- The 1980s brought the computer into the hands of the user.
  - The domain of computer hobbyists expanded from writing game programs to developing business programs.
  - Visicalc software transformed the Apple Computer from an educational or recreational device into a business machine.
  - IBM PC legitimized the personal computer and accelerated its proliferation in the office.
- The low cost of microcomputers, coupled with the still-large IS programming backlog, made the micro an expedient solution for an individual's computing requirements.
  - Unlike timesharing, microcomputers' visible cost (i.e., out-of-pocket expense) was not only low but also ~~was~~ relatively fixed. The only direct cost was for hardware and software. This total expenditure could be less than two months of timeshare ~~ing~~ expense.
  - The micro could be "programmed" by ~~the~~ users for ~~their~~ own unique needs. No interface with IS was required. It was ~~their~~ own system and

could be used to do the analysis that IS wouldn't program. The users ~~can~~ could change the program based on their own needs and desires. The users now ha~~s~~ve the flexibility they required in order ~~and can do their job better~~, to improve their productivity.

- These lofty benefits, at a cost of under $10,000, ~~was~~ were difficult to argue against. In fact, IS, in some instances, ~~were~~ was not given the opportunity.
  - Micro computers were hidden in departmental budgets as being everything from typewriters to furniture~~s~~.
  - The micro was viewed by the department using it as a personal computer. Actually, it should be considered as an expensive calculator. (~~A~~ personal productivity aid, ~~as~~ as the micro was sold, and as such should not be the concern of IS.

o IS~~'S~~ viewed ~~micro~~ the entrance of the micro into the corporate computing culture with concern and suspicion.

- They believed that ultimately IS ~~will~~ would need to be involved to help the users program these machines.
- Th~~at~~ey felt that users ~~will~~ would be spending time "playing" with their micros instead of doing what they ~~are~~ were being paid for.
- Sooner or later the users ~~will~~ would want to get access to data on the central computer.
- The personal choice of hardware and software ~~will~~ would cause ~~coefficiencies~~ inefficiencies and excessive cost.
- IS believed that micros should be avoided in most cases and definitely ~~must be~~ limited to proven applications. Above all, micros must be controlled so that corporate computing expenses ~~can~~ be properly

allocated.

- Exhibit III-1 summarizes ~~the micro views of~~ end users and IS vs views of the micro management during the birth of corporate micro computing. III-1

o Unfortunately, IS's credibility with the end-user community was low. IS's warnings went unheeded by users and management, and IS's status was lowered another notch because it was viewed as impeding the acquisition of the marvelous micro.

  - IS didn't help ~~its~~ own cause by maintaining an aloof attitude about the overpriced toys being used by the end-user community.

  - It can be argued that IS didn't start taking the micro revolution seriously until IBM introduced its PC in 1981.

o Much of IS's concerns were well founded.

  - Many micro users were becoming overpaid data entry clerks. Hours were spent entering data on micros that existed on corporate data bases. In many cases the same data ~~was~~ were entered by different users ~~on~~ to different micros.

  - Different users would be programming similar programs. These programs would not be shared because they weren't aware of the users' activities. Even when the users were aware that programs and/or data needs were the same, incompatible hardware and software made sharing impossible.

  - The inexpensive micro grew to be a major expense.

    - The initial configuration of ~~hardware~~ PCs costing under $4,000 grew rapidly with the need for more memory, hard disk storage, printers, communications devices, printers, and color monitors.

- The original $250 Visicalc software exploded with the addition of word processing, graphics, data base, and account packages, to name just a few. The users were learning what IS knew~~.~~: software can cost more than the hardware. Software also creates demand for more hardware.

o As bad as the above events were, the benefits of the micros were hard to deny.

- End users now included managers performing decision support and other analytical functions that were not necessarily conducive to a mainframe environment.

- Office systems that were previously confined to clinical activities~~,~~ that us~~ing~~ed cluster word processors were being performed on micros and evolving into mini computer~~-~~based software such as DEC's All-in-One and Data General's CEO.

- The end user was becoming computer literate. The importance of computer~~-~~generated information as a strategic asset was being recognized.

- As awareness of the power of sharing information and the need for interfacing with corporate as well as with personal computers became more visible~~,~~. There was also a realization that micro could only solve certain problems; thus, mini and mainframe computers were also required. This ~~has~~ also brought about a grudging acceptance ~~for~~ of the need for controls, standards, and compatibility~~.~~; in short, ~~a~~ the need for IS's expertise.

o IS and the end user are thus thrown together. The user needs IS's expertise and access to corporate data. IS needs to be an integral part of the end-user revolution. As Exhibit III-2 shows, INPUT projects that by 1990~~,~~ end-user III-2

computing will comprise 80% of all corporate computing.

- The relative processing power will increase 160 times from that of 1970.

- The majority of this growth will be fueled by distributed processing of decision support applications.

- Exhibit III-3 shows the current distribution of processing, ~~currently~~ as compared to that of 1990. III-3

## C. THE IMPACT OF THE END USER

o The end user has upward mobility. At first these users were mired in the lower depths of the organization. They po~~u~~red over ba~~d~~rely intelligible computer listings, verifying the computer's processing ~~prowess.~~ powers. Now the end user includes~~;~~ professionals, managers, and even executives. Xerox coined the term ~~of~~ "knowledge worker" for this new higher status user.

- The knowledge worker gets directly involved in computing through workstations (i.e., micros) on ~~thier~~ his or her desk, and through influencing the corporation's computer strategy.

- More important, the new end users are powerful. They are in the higher strata~~s~~ of the corporate ~~programial~~ pyramid and ~~they~~ have influence ~~on~~ over the highest corporate echelon.

- Exhibit III-4 shows the upward mobility of end users. Currently, the end-user community has penetrated middle management and the more senior professional levels, including corporate planners. By the end of the decade, the direct users of computer systems will enter senior management and may touch the few executives who have a desire to III-4

~~use~~ utilize end-user~~'s~~ computing tools (e.g., micros and workstations). Interested readers should ~~reference~~ refer to INPUT's report, Executive Workstations: Problems and Acceptance, April, 1984, which discusses th~~e~~is trend in executive computing.

- o The upward mobility of end users will be the catalyst for converting computer-generated data into strategic information.

  - The growing use of decision support software on micro and other computers provides added value to corporate data.

  - The upper echelon users will require information from many sources.

    - Public data bases.

    - Departmental data bases.

    - Corporate data bases.

    - Other companies (e.g., invoice status, shipping schedules, bank information).

  - The power of the users allows them to utilize this information for strategic purposes.

- o The new end user will also focus ~~the~~ attention on IS.

  - IS must provide the interfaces with multiple data bases and systems to allow the user to get strategic information quickly and effortlessly.

  - IS's successes and failures will be seen at the highest levels. IS can no longer afford to only give nodding recognition to the need ~~to~~ enhance user relations. Poor user relations could mean that responsibility for

end-user computing could be relegated to another ogranization. IS could be reduced to a data base caretaker. The stakes of end-user computing is growing. The biggest risk is to IS, but it~~s~~ is a risk that must be taken if IS is to be viewed as a strategically important organization.

- The next chapter describes the Vendor's rush to fill the end user's need with a flood of products and services. It will identify both the major trends in micro and mainframe-oriented products and the vendor's attempt to provid~~ing~~e integrated products. Chapter V will identify the issue~~'~~s associated with end-user computing and ~~identify~~ the strategies that will minimize the risks ~~and~~ as well as enhance the likelihood of developing an effective end-user computing plan.

IV

## IV THE END-USER COMPUTING GOLD RUSH

o The high visibility of the influx of microcomputers has caused some people to equate microcomputing with end-user computing. This is not the case. End-user computing is a function not product oriented. End-user computing includes:

- Office systesm application
  - text processing
  - graphics
  - decision support
  - file management
  - electronic mail
- Personal computing.
  - activity management
  - personal applications (e.g., individual budgets and schedules)
- Project management.
- Locally-controlled computer-based applications.

- Department nal budgets.
- Distributed personnel systems.

o The vendors have rushed into the diverse end-user market with a potpourri of products ~~mainly~~ focused on the microcomputer segment. This chapter will investigate ~~the~~ vendor response to ~~the~~ end-user demand. It will describe the personal, central, and multicomputer environments and will look toward~~s~~ the future products and services that vendors will provide.

## A. THE PERSONAL MICROCOMPUTER

o IBM not only legitimized microcomputers as a viable corporate computing tool, but also ~~it~~ accomplished a phenomenal marketing coup: ~~IBM~~ made the personal computer (PC) synonymous with their microcomputer.

- IBM's strategy of open architecture allowed independent software developers to provide products for the "PC."

- A large market segment was created for IBM-compatible microcomputers. These systems were priced lower or had features (such as portability) that originally were ~~was~~ not available on the PC.

- Exhibit IV-I shows INPUT's forecast of the micro's growth in the corporate market through 1986. IV-1

  - At the beginning of 1984, IBM and IBM-compatible micros accounted for 77% of the corporate micros. This group will grow at an average annual rate of more than ~~over~~ 100% in the next two years.

- By 1986, IBM and its clones will account for 87% of the corporate micro market.

o Microcomputing applications originally were personal in nature.

- The spreadsheet products were the first products purchased. This was due to the nature of the micro use~~r,~~rs who ~~they were~~ either financial or market analysts. They used the micro to aid in preparing budgets and in making forecasts.

- The use of spreadsheets provided the ~~spread into a~~ demand for rudimentary data base systems in which to store the information.

- The micro user then purchased word processing packages to increase ~~their~~ self-sufficiency.

- Vendors flooded the market with products that addressed these needs, and new innovations, such as the integrated system, ~~was~~ were introduced.

  - Integrated systems combined data base, spreadsheet, and word processing into one package.

  - Some packages also added graphics and communications. The goal was to provide one package to satisfy most of the micro users' needs.

o The success of the first micro users motivated ~~sprung a rush of~~ other corporate users to acquire micros to aid their personal productivity.

- The second tier of users were less apt to spend their time to learn complicated packages. They were less willing to tolerate the poor documentation that was symptomatic of many of the products.

- The micro was viewed as a personal computer. Thus, ~~the~~ micro owners could express their individuality by purchasing software and hardware based on their personal preference.

- The second tier of users became ~~a~~ casual users. Their micros tended to be used less than two hours a day.

o The maturing of micro usage created new demands for the user.

- Demand to automatically access and manipulate corporate data became high.

- Information management became more important, and industry-specific applications began ~~started~~ to be developed by the user, IS, and the vendor.

- Exhibit IV-2 shows characteristics of current and planned microcomputer applications. IV-2

  . The importance of spreadsheet applications is reducing considerably, but it is still one of the top application characteris~~iti~~tics.

  . File management, graphics, communications, and reporting is growing significantly.

o Understandably, nonindustry-specific applications (cross-industry) dominate microcomputers. Exhibit IV-3 shows that cross-industry applications are a signficantly larger portion of micro software than are all computer-based software. Planned micro applications still are dominated by cross-industry systems, but to a lesser degree. IV-3

- Exhibit IV-4 shows that accounting and finance applications dominate micro as well as all cross-industry applications. IV-4

    - Office and decision support systems and programming aids are significantly more important to micro users.

- The quest for individuality in each user's micro software has diminished. Function versus product has become~~s~~ more important.

    - The novelty of personal computing wears thin if there is no support or training.

    - The secondary tier of users want solutions, not necessarily the latest products.

    - IS become~~s~~ the logical source for providing support, but even IS ~~can't~~ cannot support hundreds of different products.

    - The result ~~has been~~ is that personal computing independence has become~~s~~ dependent on support. IS's expertise is coming in to vogue agian.

- IS's involvement in ~~micro~~ personal computing has led to the limiting of the number of products supported ~~and, therefore, approved being limited by~~ per application.

    - Preferred vendor~~s~~ and software packages are becoming more prominent. End users are letting IS or another technical group~~s~~ select software to satisfy their requirements.

    - Software vendors are beginning to realize~~d~~ that the purchase decision i~~n~~s returning to the IS organization.

        - There is a shake-out of micro software vendors. The smaller ones are either going out of business or concentrating on the noncorporate market. Mainframe software vendors are acquiring or merging with micro software vendors (e.g., MSA's

acquisition of Peachtree). Others are trying to penetrate the IS organization via special licensing agreements for shared use of their product by multiple systems.

- Micro-mainframe software that is coresident on micro and mainframe computers ~~are~~ is directly marketed to IS and involves cooperation between mainframe and micro-software vendors (e.g., Informatics and Visicorp's~~,~~ Visianswer product).

- Electronic distribution of micro software to end users is beginning to appear. Tymshare, Inc.~~,~~'s new service InfoTym is an example of this type of service. It acts as an on-line software catalogue, giving IS managers a means of centralizing their control over micro software. Only software listed in the catalog would be purchased by the users. Titles could change, and custom programs could be included. The programs are either automatically downloaded or delivered to the user. Unfortunately, documentation is sent at a later time.

o The biggest demand for software is user friendliness. Ease of use has been talked about but is an individual consideration.

- Menu-driven software is easy to use but becomes cumbersome once a person is trained on a system.

- Scans (pictures) may be viewed as being demeaning to some users.

- User interfaces are becoming a prominent means of product differentiation for not only software but also for hardware~~, as well~~.

  - Windowing to view multiple processors and function is receiving a ~~lot~~ great deal of attention. The demand for windowing is not clear. For some users who are operating multiprograms on different systems, windows can be helpful. Personal computing users, however, do not have a similar need.

- Mouse and other pointing devices have become personal preference items.

o Personal computing implies no communications. However, the growing use of micro has triggered demand for communicating with other computers. Exhibit IV-5 shows that the biggest demand for micro communcation is with the corporate mainframe. This demand will be investigated in section C of this chapter. IV-5

o Personal computing is only a small portion of the end-users' needs. Although micro's original purpose was that of personal computing, the need to share data and resources has become obvious. Many vendors are taking a bottom-up approach to satisfy this need.

- Local area networks (LANs) are being touted as the means for sharing resources and, in some cases, data. LANs are still in their infancy. Current LAN use is experimental and primarily only being used to share printer and disk resources.

- Multifunctionality is also required. Users are tired of waiting for reports to be printed before they can use their micros. UNIX is being heralded by some vendors as the solution~~s.~~ to the shared resource multifunctions requirement.

    - Larger micros running under UNIX can share resources and are multifunctional.

    - UNIX applications are portable to other computers that run UNIX whether these computers are micros, minis, or mainframes.

    - UNIX ~~in~~ is controversial. Although applications can be portable, they are only portable on computers using the same version. AT&T has stated that UNIX V will be the standard.

- UNIX does not interact well with bit-mapped display~~s~~ of both the IBM PC ~~and~~ Apple Computer's Macintosh, thus causi~~ng~~ prohibitive response delays of up to 10 seconds on multi-user systems.

- Major vendors, including HP and even IBM, have jumped on the UNIX bandwagon. It appears that there will be a lot of UNIX systems in response to the multifunction, multi-user demand. But is a micro the best vehicle ~~to~~ for satisfying this demand?

o The province of personal computing in coming years will be the portable computer. Portables range in cost from under $1000 to over $6000 and weigh from 30 pounds to under 8 pounds.

  - Many of the portables have basic software contained on its read-only memory (ROM).

  - They have communications capabilities and connections for peripherals.

  - Although some of the portables (e.g., IBM) can connect to networks, most of these portables are intended for solely personal use.

o End-user computing supersedes personal processing. To satisfy the office and decision support needs of the end users ~~are~~ a more complex computing environment is required. The next section of this chapter will investigate~~s~~ mainframe and minicomputer-based end-user systems.

## B. THE CENTRAL ANSWER

o Mainframe/mini-based end-user systems in many cases predate the micro's rush into the office.

- Rudimentary word processing and messaging systems have existed for over ~~ten~~ 10 years.

- In-house timesharing systems allowed end users to program their own solutions.

- Most of these systems were written for a technically competent user, requiring a long time to master.

o In the early 1980s major vendors developed integrated office systems. These systems were marketed as add-ons to the current systems environment.

- IBM's Professional Office System (Profs) did~~n't~~ not become an official product until 1982 but ~~was being~~ had been used by customers since 1980. It is VM-based and provides integration of activity management, records management, electronic mail, and text processing. IBM did not initially have adequate support ~~f~~or peripherals to ~~support~~ maintain this product. For example, a good letter quality printer was not made available until 1983. Profs only operate~~s~~ under VM. MVS users that were not running under VM were left out of IBM's central office system. The MVS world can access documents created on other IBM products (Displaywriter, 5520 Administration System and 8100) using DISOSS (Distributed Office Support Systems). They do not have Profs integrated office functions as of yet.

- In the minicomputer market, the major vendors have their own versions of integrated systems. These systems provide the same features as Profs and in addition, decision support, data processing, and communications ~~as well.~~ applications. These products include:

  - Data General Comprehensive Electronic Office System (CEO).

  - DEC's All-in-One.

- WANG's Office.

o These centralized office systems were initially marketed as add-on applications. The problem~~s~~ that arose was that the office user was contending with other applications. Response time and storage contention caused problems.

  - The minicomputer manufacturers are addressing this problem by selling office solutions. That is, they are bundling the software with a suitable hardware configuration. The amount of spending on microcomputers prove~~n~~s that there is a market for a turnkey office solution.

  - IBM has a tougher problem. Users are not going to purchase a 4300 ~~to~~ merely to run Profs. IBM has been trying to sell Profs as part of the information center environment, ~~where~~ justification for a 4300 configuration is easier.

o These central systems bundled with hardware represent~~s~~ an investment of hundreds of thousands of dollars. It~~s~~ is not necessarily unjustifiable, but it obviously will receive more scrutiny than a microcomputer purchase. This should not dismiss these systems. In fact, they may be a more appropriate solution. It does require at least a departmental view, if not a corporate view, of end-user requirements. This will be discussed in the next chapter.

o Subsets of these centralized office systems will be migrated down to smaller computers.

  - DEC has announced a subset of All-in-One to be available on its Professional 325 and 350 microcomputer.

  - IBM should offer some of Profs functions on its System/36 as well as provid~~ing~~e similar functions for MVS users.

- The central computer will not be left out of the end-user revolution. It will be a switching center for micro and mainframe applications. It will be the repository for corporate information, including text, image, data, and eventually, voice. It has the processing power for more complex decision support applications, and it has advanced communications capabilities to tie together the diverse information requirements of the end-user~~'s~~ community. ~~together.~~

- The next section will address~~es~~ the integration of the central and micro environments. This will be followed by a projection of the new products and services that the end-user vendors will be providing.

## C. THE BEST OF BOTH WORLDS

- Providing either physical or telecommunication connections between micros and mainframe/minicomputers has the potential for supplying ~~providing~~ the best solution ~~to~~ the diverse mix of end-user needs.
  - The power of the central processor can execute either data or computational intensive systems that are beyond the capability of most micros.
  - The central processor can be the multi-user switching center for communications and data.
  - The micro can provide the flexibility and independence of local processing.

- The conceptually simple solution has one major hidden solution: software. The solution is obvious to vendors, but the risk of program error will not only affect the micro but may also affect the central computer and its ~~their~~ numerous users.

- o Minicomputer vendors are proposing a "total" solution of hardware and software that allows their own and IBM-compatible micros to directly connect to their system. They also provide communication software that conforms to IBM's SNA communication protocol, and some even support IBM's Document Content Architecture (DCA) and Document Interchange Architecture (DIA). DCA/DIA are IBM's standard ~~from~~ for transmitting and storing text and images.

- o On a larger scale, vendors are flocking to provide micro and mainframe software to link these two environments.

  - Micro-mainframe links are the subject of two INPUT reports.

    - End-User Micro-Mainframe Needs ~~Micro-Mainframe: End-user Experiences~~, July ~~August~~, 1984.

    - Micro-Mainframe: Telecommunications Issues, August, 1984.

  - Micro-mainframe software can range from merely downloading data from the mainframe to interactive systems that have both micro and mainframe sectors operating simultaneously.

- o Exhibit IV-6 shows INPUT's forecasted growth of micro-mainframe applications through 1988. IV-6

  - From just over 3% applications, micro-mainframe applications will comprise over 25% of the corporation's computer applications.

  - These applications include both purchased and internally developed systems.

- o The source of micro-mainframe applications is projected to come from modifying existing software, as reflected in Exhibit IV-7. New applications is the second most important source, whereas new applications using existing IV-7

data bases is viewed as least important. Vendors surveyed thought that new applications would be the most important source of micro-mainframe applications, although this may be prompted by a vested interest in selling more software.

- o Vendors, however, have more experience in micro-mainframe development. They are more aware of the current pitfalls associated with developing micro-mainframe linkages.

  - Even though there may be an advisory relationship between IS and vendors, IS respondents believe that vendors will have high involvement in micro-mainframe applications, as shown in Exhibit IV-8. IV-8

  - The respondents stated that vendors' expertise is invaluable in creating complex micro-mainframe linkages. But the respondents emphasized the importance of selecting a vendor that had ~~with~~ good products, experience, and~~, most important,~~ trustworth~~y~~iness.

  - The complexity of the micro-mainframe requirement is depicted in Exhibit IV-9. Over half the companies require multiple data base, IV-9 multiple mainframe~~,~~ and multiple telecommunication linkages. This environment is fraught with danger.

- o Micro-mainframe can be carried to an extreme and ~~be~~ used as an alternative to LANs~~,~~ as shown in Exhibit IV-10. In fact, IBM's much delayed LAN IV-10 introduction can be a blessing for the mass storage and mainframe segment of its ~~their~~ business.

  - Micros can cause a large increase in demand for mass storage devices. In INPUTs 1984 Information Systems Planning Report, July~~,~~ 1984, respondents projected that mass storage devices would increase by ~~15~~ 13%, the third highest growth budget category.

- There is room for LANs in the micro-mainframe world, but it requires proper planning and the commitment by IS to enter the unfamiliar LAN territory.

## D. WHERE'S THE NICHE

- Mainframe and mini vendors are concentrating on the office and end-user market. They will be providing general purpose tools such as fourth-generation languages, decision support software, text processors, etc.
- Other vendors are looking for niches in order to sell their products.
  - Protocol converters to ease micro, mini, and mainframe linkages.
  - Communication gateways between LANs, PBXs, and mainframe systems.
  - Computer-aided education systems to assist in end-user training.
- The largest area of activity will be in the ~~resurrect~~ resurrection of integrated (i.e., turnkey) systems.
  - Vertical markets will be exploited with software packaged in a configuration of micro processors, peripherals, and communications.
  - Vendors will get into the solution business. They will be value-added ~~resolvers~~ resalers of hardware, software, and systems. They will provide customized solution at the industry, company, and user level.
  - This new breed of vendor will combine consulting with package development. As such, ~~they~~ can become a valuable asset in IS end-user support strategy.

- The next chapter will investigate the end-user computing issues and strategies that IS can employ to satisfy the ~~corporations end-user's~~ computing needs~~,~~ of the corporations' end users.

V

# V END-USER SYSTEM ISSUES AND STRATEGIES

- This chapter investigates the issues driving the end-user revolution and the strategies that have been employed to address them. Strategies that should be employed in the future are also addressed at the conclusion of this chapter.

## A. ISSUES

### 1. NEW PRODUCTS

- The flood of new end-user computing is misleading.
    - Although the number of products being introduced is still increasing, most of them are only addressing the same functions.
        - text processing
        - electronic mail
        - activity management
        - electronic filing
        - graphics
        - decision support

  - communications.

- Packaging is becoming a key factor in product differentiation.

- Integrated micro systems~~,~~ combine a number of the above functions without adding value.

  - Windowing, mouse interfaces, and icons are more sizzle than substance.

o New products are improving user interface and catering to the user's demand for individuality.

- Many users are realizing that~~,~~ as long as software will satisfy their business needs, the actual product is unimportant. This is reinforced if IS supports a particular product (or products). The need for self-determination on a particular graphics package quickly vanishes if ~~they~~ users have to train and support the package themselves.

- IS~~,~~ however, cannot remain bl~~e~~ind ~~on~~ to new software products. If IS takes responsibility for evaluating new products and determines their value to the corporation, the issue of hundreds of text processors, for example, will evaporate.

- Hardware products can be more problematical. Again, IS must identify preferred equipment that will run recommended software. Personal preference peripherals, such as~~,~~ mouse, touch screens, color monitors, plotters, and letter quality printers, can be added to preferred equipment. The cost advantage of volume purchase agreements ~~agree~~ argue strongly for users to select preferred equipment.

o The key to defusing the potential new product is for IS to be actively involved in evaluating and supporting end-user-oriented hardware and software. IS's Benign

neglect of the end user ~~by IS~~ will cause the array of products used in an organization to be vast and the commensurate problems severe.

## 2. MICRO'S ROLE IN END-USER COMPUTING

- The microcomputer is evolving into a multifunctional workstation for end-user computing purposes.
  - The stand~~-~~alone user will be the specialist, concentrating on personal computing and having little need for communications.
  - Office systems applications are communications oriented. The micro will be connected either directly or via telecommunication to central or departmental computers.
  - Micro-mainframe linkages for application processing and decision support activities also require~~s~~ the micro to become a virtual workstation to the mainframe.
- The micro may be connected to LANs or to central processors for resource sharing purposes. The demand for storage, printing, and communications will grow for most micro users. The cost of providing these peripherals will not be justifiable for each micro user.
- As the shared resource and communication needs become more apparent, companies may replace stand~~-~~alone micros with minicomputer systems ~~with~~ that have workstations contain~~ing~~ some local processing power as a more cost-effective solution. INPUT's 1984 Information Systems Planning Report, July~~,~~ 1984, identified minicomputer acquisition as one of the highest growth areas in IS's budget.

## 3. THE VENDOR'S ROLE

- ~~Up~~ until recently, the vendor ha~~s~~d been working directly with end users and had ~~with~~ little contact with the IS organization.
  - End-user~~s~~ computing was equa~~led~~ted ~~with~~ word processing and micro computers.
    - Word processing vendors dealt almost entirely with office staff. As these vendors added office systems functions to their systems, they still worked with the end user.
    - Micros were initially purchased from retail outlets by the end user.
    - Minicomputer vendors were dealing directly with their primary customers, engineers, scientists, and manufacturing departments. These vendors added office software to these systems for their primary customer base.
    - Vendors provided end users with excellent service and consulting to remove the technological barriers their products might present to their customers.
  - End-user vendors usually only dealt with IS when data communications ~~was~~ were required between their equipment on IS controlled systems.
- IS began to get involved with these vendors as end-user computing began to encroach on their domain of corporate computing. IBM's accelerated entry into the end-user arena, via its PC and then enhanced software connecting its diverse office products (e.g., Displaywriter, and 5520) got IS involved with end-user computing. Soon other vendors began to ~~count~~ on IS as a key influencer ~~of~~ on office systems.

- Today, the vendor's role is shifting from that of service provide~~s~~r and consultant to the end user~~,~~ to that of ~~a~~ product provider.
  - Many vendors are bowing to IS's position as corporate computing provider. They are beginning to sell to IS and to let~~ting~~ IS do the consulting and provid~~e~~ing of ~~the~~ service to the end user.
  - Vendors are becoming very careful not to step on IS's toes. They know that IBM has a foothold in IS and don't want to increase IBM's advantage.
  - Vendors will still support their systems but usually at IS's direction. The vendors are in a credibility building phase with IS. They believe that IS holds the future to their success.
- In the future, vendors want to be perceived as solution not product providers. Once their credibility is established, they want to be used by IS as end-user computing consultants ~~by IS~~, a similar role to the one ~~as~~ IBM plays in many organizations' data processing departments. If this vendor strategy is successful, ~~their~~ sales could be greatly benefited, since IS can be the key to the entire corporation's end-user computing purchases.
- This vendor's strategy could benefit IS and the corporation, if properly managed. Many vendors, especially those involved with new technologies, can be a valuable technical resource. But runaway vendor reliance can cause severe problems. Like any other resource, vendors must be well managed to be effective.

## 4. CORPORATE RELATIONS

o One of the biggest impediments to successful end-user computing is the poor relations between IS and the user.

  - IS is perceived as unresponsive by the users.

  - Users are viewed as naive by IS.

o Much of the demand for micros was fueled by the user~~'~~s' perceptions that IS could not satisfy the user~~'~~s' computing needs.

  - Users viewed the micro as a panacea ~~to~~ for their computing needs.

  - IS viewed the micro as an expensive toy that will cause more problems than ~~they~~ it will solve.

o Users and IS are now thrown together in a marriage of necessity.

  - End users have proven that the micro and other end-user products can be beneficial but ~~they~~ are not the cure to all their computing needs. ~~The~~ End users ~~is~~ are reluctantly realizing that IS expertise is needed and wanted to improve ~~their~~ computing productivity. The novelty has worn off~~;~~ and ~~the~~ users no longer want~~s~~ to spend their time "programming" and learning computing; they want to perform their vocation better.

  - IS cannot afford to gloat ~~at~~ over the problems that end-user computing has caused. True benefits have been demonstrated, and legitimate needs to access dat~~e~~a on corporate computers have been identified. More important, if IS does not support end-user computing, someone else will, thus deleting IS's power base.

- Holding the shotgun over this marriage is senior management. They have seen the $5,000 micro explode into a multimillion dollar end-user computing expense. End-user computing must be managed, and the management requires that the end user and IS work~~ing~~ together.

o For IS to effectively take ~~its~~ place as the technological leader ~~in IS~~, it must improve ~~its~~ image. Exhibit V-1 shows both IS's and senior management's perception on how IS can improve ~~its~~ image. V-1

  - Both IS and senior management agree that the way for IS to improve ~~its~~ image is through performance. Exhibit V-2 shows the key performance areas IS need~~s~~ to improve: V-2

    - Accurate budgeting was the top performance area. This reflects senior management's cost orientation.
    - Responsiveness to management and user needs was second.
    - Scheduling was the third highest. Again, completing computer projects when promised is a key to improving IS's credibility.
    - The top performance issues are all visible and ~~seeded~~ based on IS's past transgressions.

  - The second highest image improvement area is communications. IS must improve ~~its~~ rapport with management and the end user. The challenge is that ~~the~~ end users ~~is~~ are a numerous group with diverse interests and needs. IS must be visible and provide assistance to these users. IS must become the end users' ally, not their adversary, if IS's image is to improve.

## 5. SUPPORT

- IS's involvement with end-user computing puts it into the service business. The end user needs training, programming assistance, ~~needs~~ consultation, and technological guidance.

- Currently IS is providing most of the end-user support, as reflected in Exhibit V-3. 93% of the respondent companies had IS take at least some part of end-user support. V-3

- Exhibit V-4 shows the distribution of end-user support staff in the IS and end-user departments. The median number of IS support personnel is ~~6~~ six full-time people, whereas most organizations did not have any users supporting end-user computing. Wh~~ere~~en a company had end users supporting their own needs~~;~~, it was primarily in microcomputer support. V-4

- Exhibit V-5 shows the distribution of IS support among the three major components of end-user computing: microcomputers, information centers, and office systems. V-5

  - Both micro and information center support had median of ~~2~~ two support personnel.

  - Office systems had very little support in most organizations.

- IS's support organization is not staffed at a level that can meet end-user demand. The tarnished image is not going to improve with the low number of staff assigned to end-user computing.

  - One problem may be in IS's getting management's approval for adequate staffing levels. The problem may return to IS's control, however, since ~~they~~ it may not be communicating the need for a rich service organization to protect the end-user computing investment.

- IS's end-user staffing problem is symptomatic ~~to~~ of its total personnel problems. Exhibit V-6 categorizes IS's major personnel problems. V-6

  - Education is the top problem. It is ~~exasperated~~ exacerbated by most IS personnel being untrained in end-user issues and business requirements.

  - Recruitment to the end-user group is difficult because it requires people with technical, communication, and business skills. These people are difficult to find and not inexpensive.

o If IS is to be an active participant in the end-user revolution, it must get into the service business. Otherwise, it will be merely a very interested observer.

## 6. BENEFITS

o The benefits of end-user computing can be illusory. The cry of increased productivity heralded whenever justification is required.

- Some micro users have spent many hours programming, data entry and operating their computers instead of doing their actual job.

- Productivity is an opportunity benefit. It provides more time for the knowledge worker and provides ~~them~~ higher quality information. But, it is up to the users to improve ~~their~~ performance based upon this benefit.

o The most exciting opportunity is for users to receive new, higher quality information that can be utilized to enhance strategic decisions. The information age is going to reward companies that have the best and most timely information and can use that for a competitive advantage.

- o Although these opportunity benefits may be intangible, they are still powerful. One of the challenges confronting IS is to provide these benefits at minimal cost.
  - The cost is not only of products and services but also of inefficient operations (recall the end-user programmer).
  - Additional cost reduction opportunities include:
    - Paper expense.
    - Filing time.
    - Text preparation.
    - Report development.
    - Communications.
- o The power of end-user computing resides with the opportunity benefits, but the tangible benefits are cost reductions. Cost reduction by itself is insufficient to justify a major commitment to end-user computing. The changing fiber of the corporate competitive culture demands this commitment.

## B. STRATEGIES: PAST, PRESENT, AND FUTURE

### I. PAST

- o IS end-user computing strategies were primarily reactive.
  - IS was overburdened with application backlog; ~~and~~ IS was not concerned if the users ~~could~~ solve~~d~~s their own problems ~~without~~ as long as they did not affect~~ing~~ the corporate computing environment. ~~that was great.~~

- Unfortunately, many of the end-user solutions affected the corporate computing environment. This put IS in its perceived role as naysayer. The end-user demand may be legitimate, but ~~they~~ end users had to wait in line like everyone else.

o One proactive strategy was the information center (I/C). With ~~T~~the not necessarily ~~alternative~~ altruistic assistance from IBM~~s~~, ~~M~~many IS departments established an information center equipped with support staff and user-friendly software. Unfortunately, the scope and impact of the information center was not adequately analyzed. Too many I/Cs were doomed by ~~its~~ their own success.

- The high demand for the use of the information center strained IS's people and computer resources.

- It became clear that most ICs would require ~~its~~ their own mainframe, a string of disk drives, and IS to provide extracts from corporate data bases.

- The brilliant plan of having users help themselves backfired in some cases by increasing expenses and, in ~~some~~ other instances, by actually closing the ICs and alien~~ated~~ating their users.

o Some organizations expanded word processing installations to office system pilots. IS provided technical expertise but were not the leader of this project. Overall, the past IS strategy could be typified as benign neglect.

2. ~~CURRENT~~ Present

o The micro has been the catalyst for end-user computing. It has made the user~~'s~~s' needs more visible and the complexity of satisfying those needs greatly understated.

- The proliferation of end-user computing products in general, and of micros in particular, has forced IS to become actively involved.
  - Senior management saw growing expenses and little tangible benefit of these systems. They challenged IS as the corporate computing organization to control and manage end-user computing.
  - IS saw a two-pronged attack on its computing citadel.
    - Users were establishing mini IS organizations in each of their departments.
    - A high demand for ~~extracts of~~ corporate data being extracted and/or accessed by the end user. (The information center staffing problem was now being amplified by a larger number of users.)
- IS's reaction was to finally establish a group to support the end user. This group's ~~Their~~ primary function was to evaluate hardware and software, creating preferred product lists that IS would support. Training and support functions were being passively provided.
- The end users were ~~was~~ overly optimistic as to the power of their local processors and the ease of adding function and of increasing the amount of data they processed.
  - The ease in which ~~a~~ users can create a spreadsheet made them assume that it would be just as easy to manipulate mainframe-based data.
  - Conceptual easy additions to their systems, such as communicating with other micros or sharing resources, were difficult to achieve. Many users believed that the complexity was invented by the IS organization.
- The current IS end-user strategy is typified by conscientious control. The vast array of products and systems must be managed to maximize the large poten-

tial benefit while controlling what has been an uncontrollable expense. This is a thankless task, but one IS is used to performing.

## 3. FUTURE

- IS must become proactive. The growth of end-user systems ~~have~~ has emanat~~ing~~ed from the depths of the organization and percolated upward. To be effective, end-user computing must take a corporate view.
  - The information needs of the entire organization must be the foundation of corporate computing in general and of end-user computing in particular.
  - The top-down approach will identify the communications needs and interfaces these systems must provide.
- IS must establish an enriched support structure.
  - Training is imperative. It must encompass computer-aided training, classroom instruction, and individual education.
  - Programming assistance is required. Personal computing begets customized needs. IS programming expertise can greatly ease the potential problems and pitfalls that the user may encounter. Programming and systems analysis support is especially critical on mainframe and mini-based systems.
  - General consulting/liason could greatly improve IS's image. The two biggest blemishes on IS's image is its lack of responsiveness and poor communications. A consultant/liason could be viewed as the end-user's account executive. ~~They~~ He or she would be responsible for understanding the user's needs and for working with them ~~to satisfy them~~ these needs.

- IS must take the leadership position in implementing end-user systems. These systems must be viewed from the perspective of the corporation's information need. The goal must be to get the right information to the right person, in the right format, at the right time. This optimum end-user computing strategy is corporate consciousness. Exhibit V-7 summarizes IS's past, present, and future strategies. V-7

VI

## VI CONCLUSIONS AND RECOMMENDATIONS

- The end-user revolution is fueled by need and technology.
  - ~~The~~ end users had tired of waiting in multi-year computing queues to have their programming requests satisfied. Some users have utilized timesharing computer organizations (both internal and outside the corporation), but utilizing these services usually required a degree of technical acumen beyond most users.
  - The microcomputer, coupled with VisiCalc and its clones, gave ~~the~~ end users the tools for which ~~to~~ start solv~~ing~~ their own problems.
- Micro mania spread through many organizations. The micro was the declaration of independence from IS bondage. But the power of the micro and its software did not satisfy all the needs. In fact, the end-user's demands for data access grew rapidly.
  - The users grew tired of re-entering data that resided on the central computer. They wanted access to mainframe data.
  - This minor request for mainframe data has caused the birth of the micro-mainframe market.
    - Vendors are rushing in to provide both micro- and mainframe-based products.

- IS is cautiously evaluating the impact of micro-mainframe applications on the corporate computing culture.

- The user is wondering why there is such ~~all the~~ concern over the ~~for merely~~ us~~ing~~e of corporate data.

o Minicomputer vendors are providing turnkey office solutions. They are providing office systems software, micro connection capability, and communications.

  - These vendors are walking a fine line. They are trying to satisfy the traditional customers (office and engineers) without offending their future customers, IS.

  - The minicomputer vendors are trying to get a presence in the IS department. They believe IS will have the most power in end-user computing conflict. The minicomputer vendors believe that IS will ultimately influence end-user purchases for the entire organizaton.

o End-user computing has grown from the bottom of the organizaiton, spreading upward throughout the corporation. The spread of end-user computing has been unplanned and is contrary to the top-down need for strategic information.

o ~~Up~~ Until recently, IS has been a very interested observer of the growing end-user computing phenomenon. As its visibility entere~~d~~s the executive suite, IS has become the logical department to control and manage this high-potential, high-cost area.

  - IS has the technical resources and knowledge to administer end-user computing.

- As the corporate computing organization, they should be taking a leading ~~or~~ not a passive role.

- If IS ~~can't~~ cannot manage end-user computing, management will find another group that will.

o IS's controller role does not enhance its already poor image with users.

- IS will become~~s~~ policem~~a~~en, telling users what they can and cannot do. The perception is that IS is saying no again.

- If IS does not effectively control the growth of end-user systems, ~~their~~ its credibility will be greatly diminished with senior management, and IS stature in the organization will be diminished.

o IS can take a leadership position in end-user computing by becoming a facilitator.

- Help the users do their job better by providing a list of preferred equipment and software that IS will support.

- Establish an end-user support organization that has a sufficient number of staff to service the training, technical, and general support requirements of the user.

- Establish a microcomputer users' organization to exchange ideas, discuss mutual problems, and communicate requirements to IS.

- Establish a group that works with senior management, and end users to do long-range end-user systems planning.

- Deliver projects on time. Performance and communications improvements are the keys to elevating IS's image.

o Once the current end-user environment is controlled, begin planning a top-down approach to corporate computing in general, and to end-user computing in particular.

- The goal of systems is to solve business problems and to provide timely, strategic information.

- The plan should be built upon a foundation of IS end-user trust.

- The plan should address the multi~~-~~faceted needs of corporate computing with the following ~~a~~ computational and informa~~l~~tional hierarchy: ~~being.~~

    - Corporate.

    - Departmental.

    - Personnel.

- Exhibit VI-I summarizes the corporate view of end-user computing. VI - 1

o End-user computing can be the primary vehicle for providing the corporation with a competitive advantage through the delivery of timely, strategic information to the proper people. If end-user computing remains unplanned and poorly managed, it may become merely a high-priced fad. IS can make the difference.

U-EAR

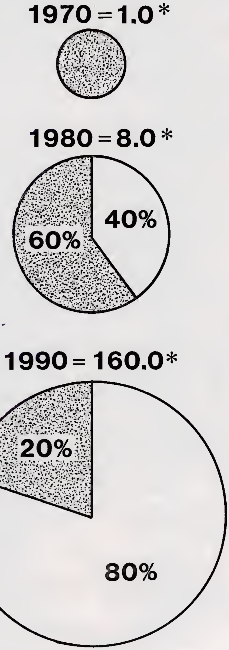
EXHIBIT II-1

# I.S. SHOULD ACT AS A FACILITATOR OF END-USER COMPUTING

- **Help Users to Help Themselves**
- **Satisfy Commitments on Time**
- **Establish a Rich Support Organization**
- **Establish a Planning Group**

EXHIBIT II-2

# THERE IS A MAJOR SHIFT TOWARD~~S~~ END-USER COMPUTING



* Relative Processing Power, With 1970 = 1

▨ Traditional Computing

☐ End-User Computing

EXHIBIT II-3

## THE END-USER COMMUNITY IS GROWING

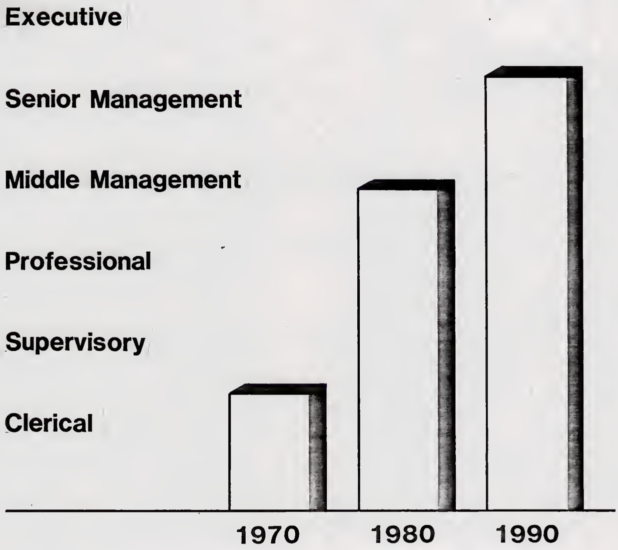


EXHIBIT II-4

# MICRO APPLICATIONS ARE MORE CROSS-INDUSTRY ORIENTED THAN APPLICATIONS IN GENERAL

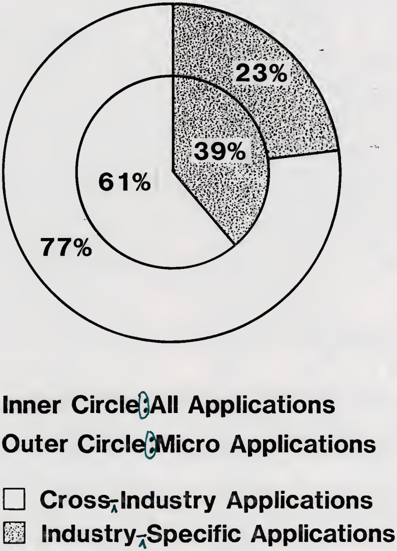


EXHIBIT II-5

# MICRO-MAINFRAME APPLICATIONS WILL GROW SIGNIFICANTLY BY 1988

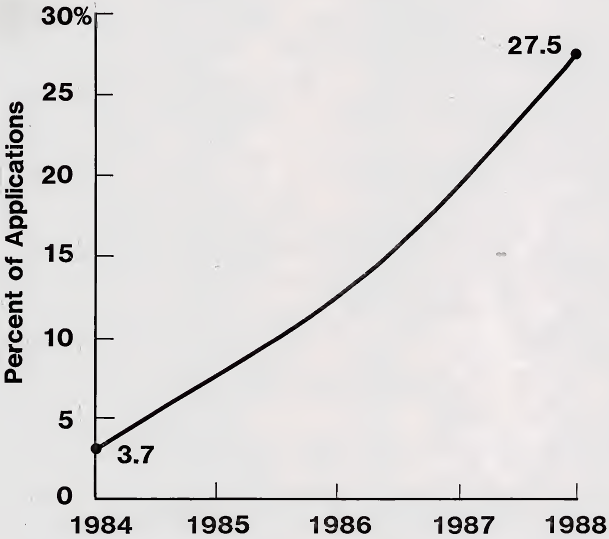


EXHIBIT II-6

# THE VENDOR IS WALKING THE TIGHTROPE

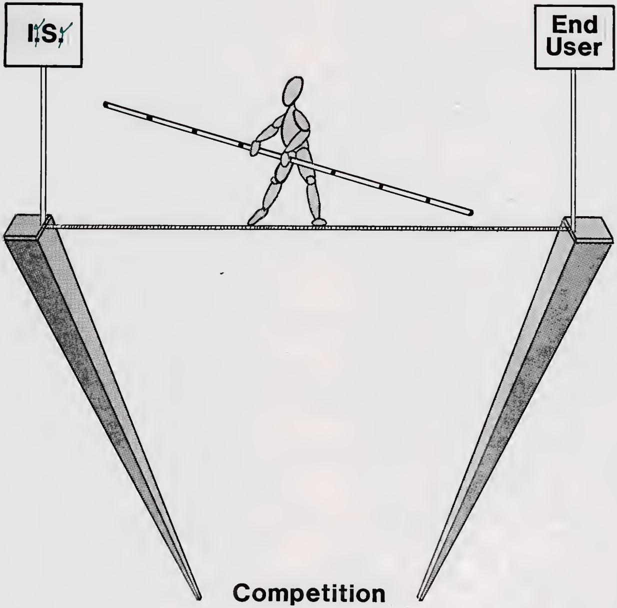
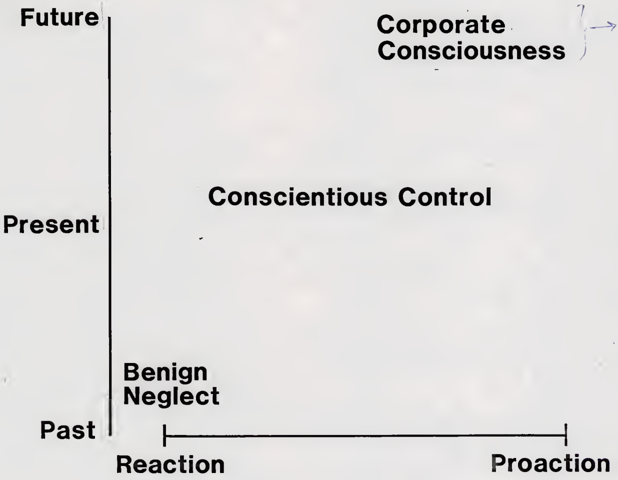

I.S.
End User
Competition

EXHIBIT II-7

# I.S. END-USER COMPUTING STRATEGIES ARE JUST STARTING TO DEVELOP


Future
Corporate Consciousness
Conscientious Control
Present
Benign Neglect
Past
Reaction
Proaction

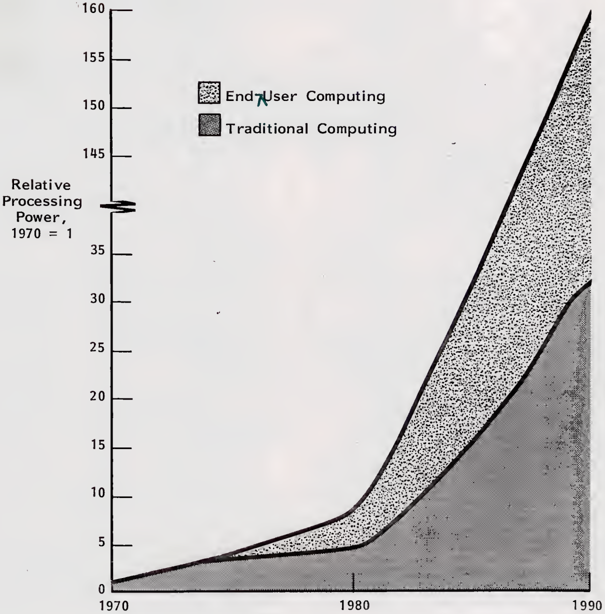
## EXHIBIT III-1

## MICRO VIEWS (CIRCA 1981)

| End Users | I/S Management |
|---|---|
| ● Responsive | ● Avoid |
| ● Flexible | ● Limit |
| ● Self-Direct~~ion~~ed | ● Control |

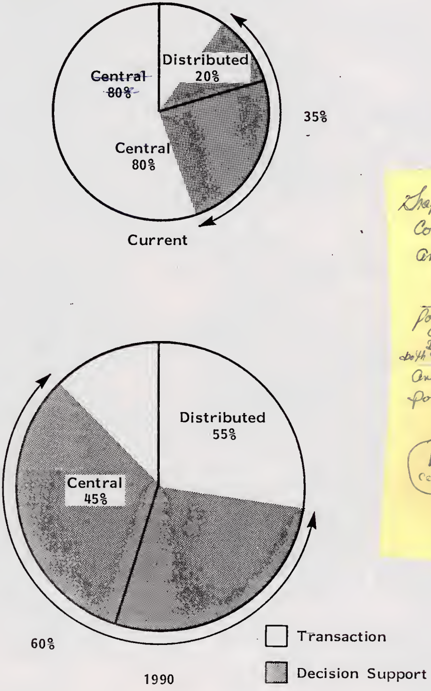
EXHIBIT III-2

## EXPLOSIVE GROWTH IN END-USER COMPUTING



## EXHIBIT III-3

## CHANGES IN COMPUTING FOCUS



Graphic:
Confusing
Any ideas
to clarify
?
Possible placing
central +
Distributed in
both the shaded
And unshaded
portions
i.e.

?

EXHIBIT III-4

## UPWARD MOBILITY OF END USERS

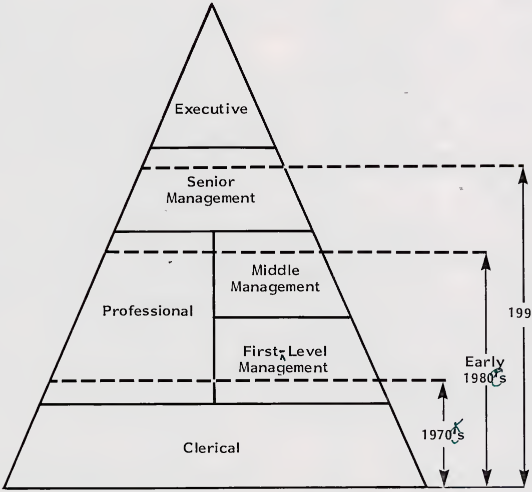
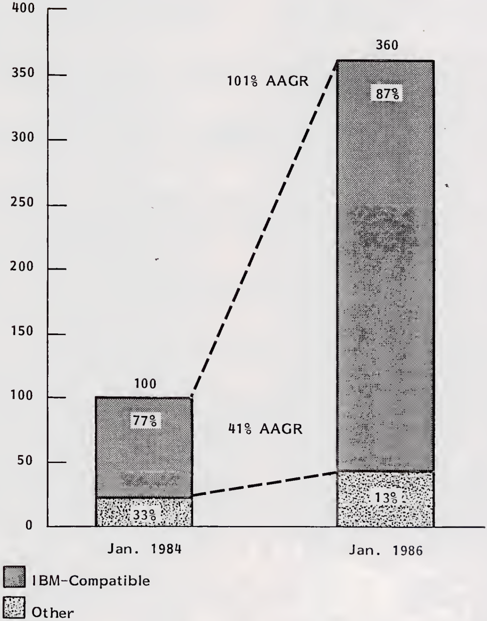

Executive
Senior Management
Middle Management
Professional
First-Level Management
Clerical
1990
Early 1980's
1970's

EXHIBIT IV-1

## CORPORATE MICRO GROWTH, 1984-1986



## EXHIBIT IV-2

## APPLICATIONS CHARACTERISTICS: CURRENT VERSUS PLANNED

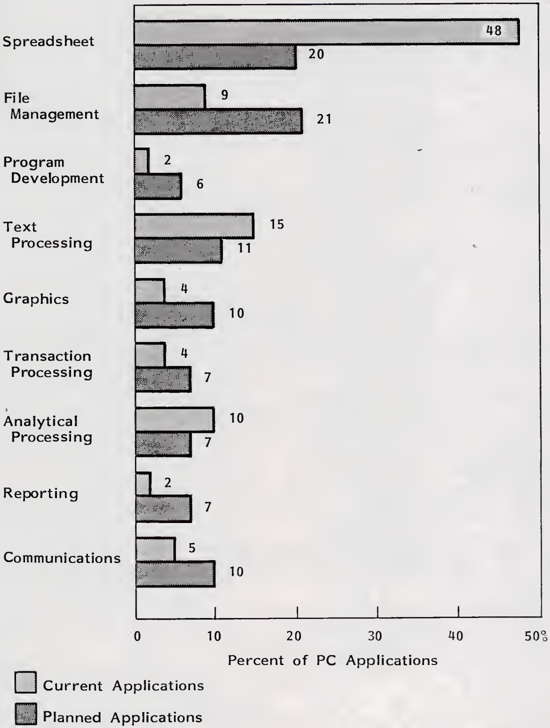


EXHIBIT IV-3

## MICRO APPLICATIONS ARE MORE CROSS-INDUSTRY ORIENTED

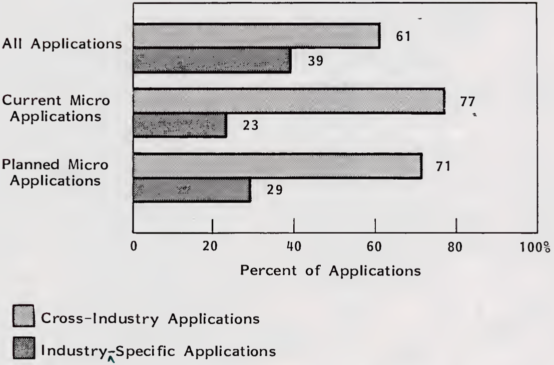


EXHIBIT IV-4

## MAINFRAME VERSUS CROSS-INDUSTRY MICRO APPLICATION DISTRIBUTION

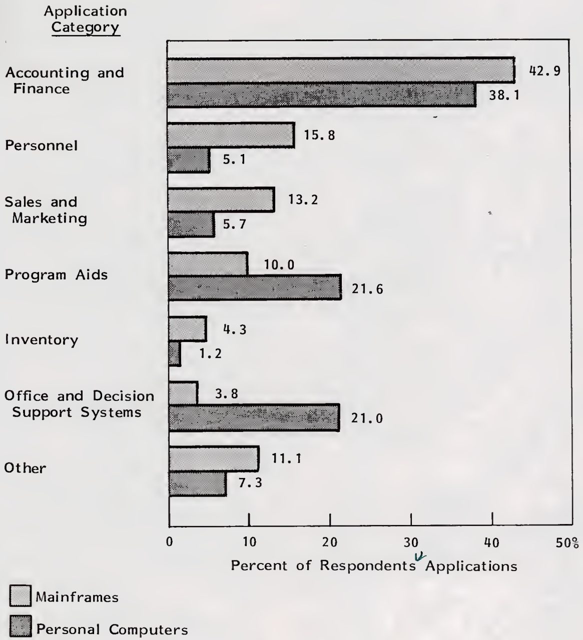


EXHIBIT IV-5

## EXTERNAL MICRO COMMUNICATIONS: LESS IMPORTANT

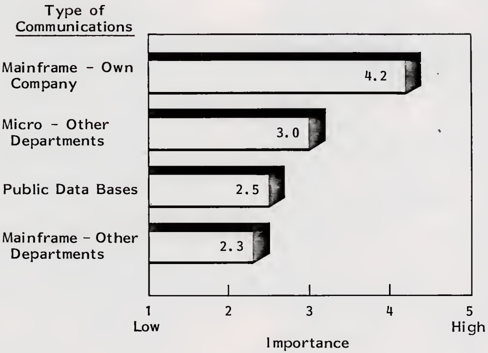


EXHIBIT IV-6

## HIGH MICRO-MAINFRAME APPLICATIONS GROWTH 15

1984-1988

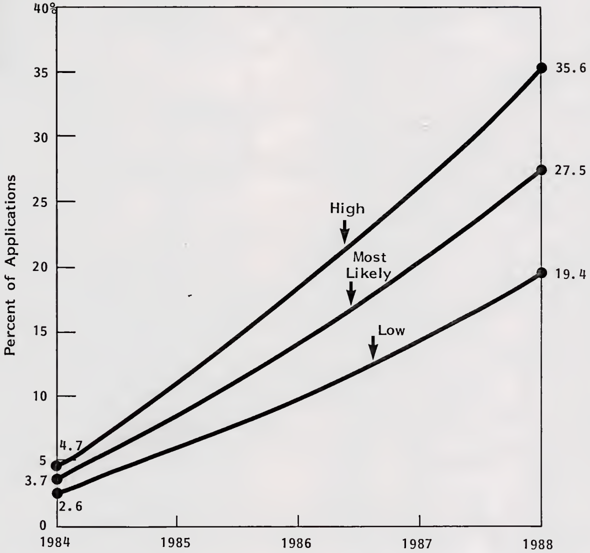


EXHIBIT IV-7

## DEVELOPMENT STRATEGIES: CORPORATE AND VENDOR VIEWS

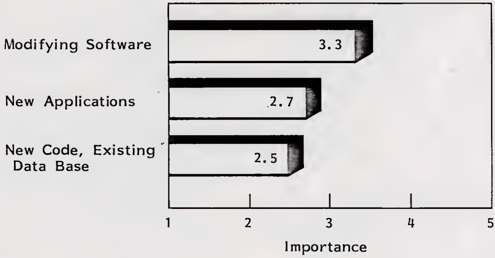
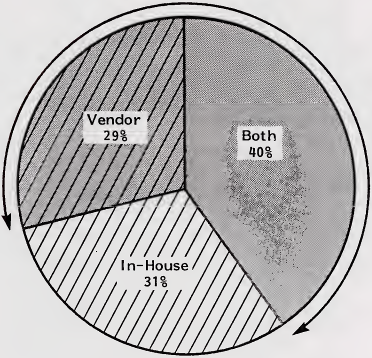


EXHIBIT IV-8

## HIGH VENDOR INVOLVEMENT IN MICRO-MAINFRAME APPLICATIONS



Vendor Participation 69%

EXHIBIT IV-9

## COMPLEX ENVIRONMENTAL LINKAGE

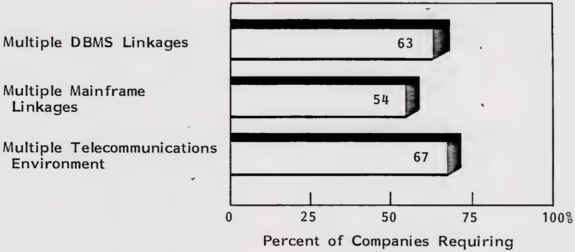
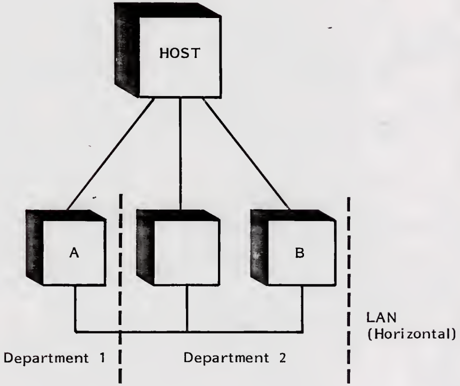


EXHIBIT IV-10

# MICRO-MAINFRAME CAN SQUEEZE LAN


HOST
A
B
LAN
(Horizontal)
Department 1
Department 2

## EXHIBIT V-1

### HOW TO IMPROVE I.S.'S IMAGE

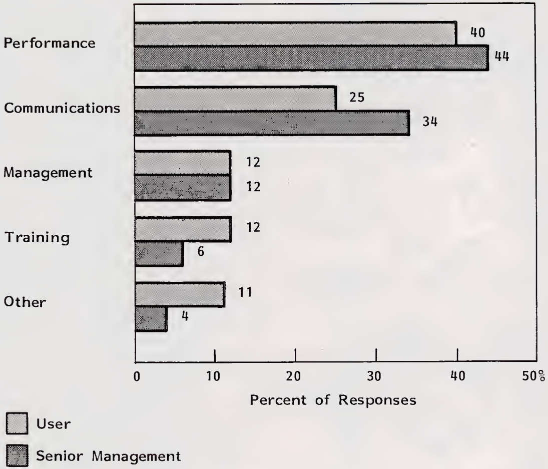
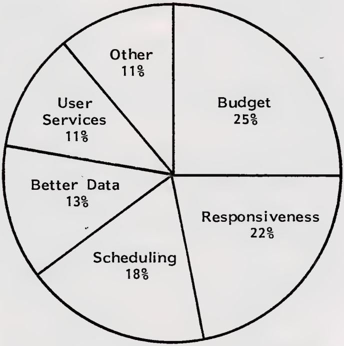


EXHIBIT V-2

## PERFORMANCE IMPROVEMENTS*



Percent Total Responses

* Both User and Senior Management

EXHIBIT V-3

## SOURCE OF END-USER SUPPORT

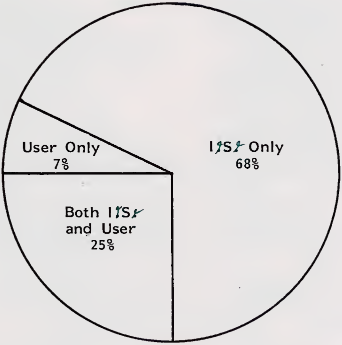


EXHIBIT V-4

## NUMBER OF END-USER SUPPORT STAFF

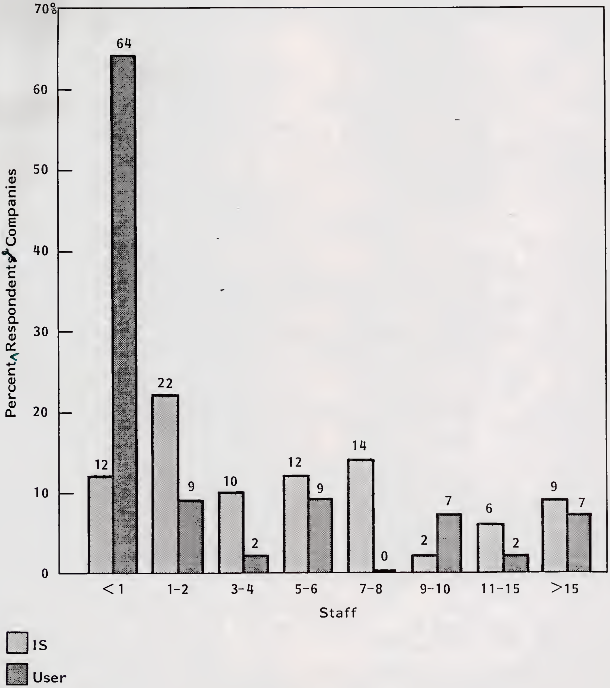


EXHIBIT V-5

## NUMBER OF I.S. STAFF SUPPORTING END-USER COMPUTING

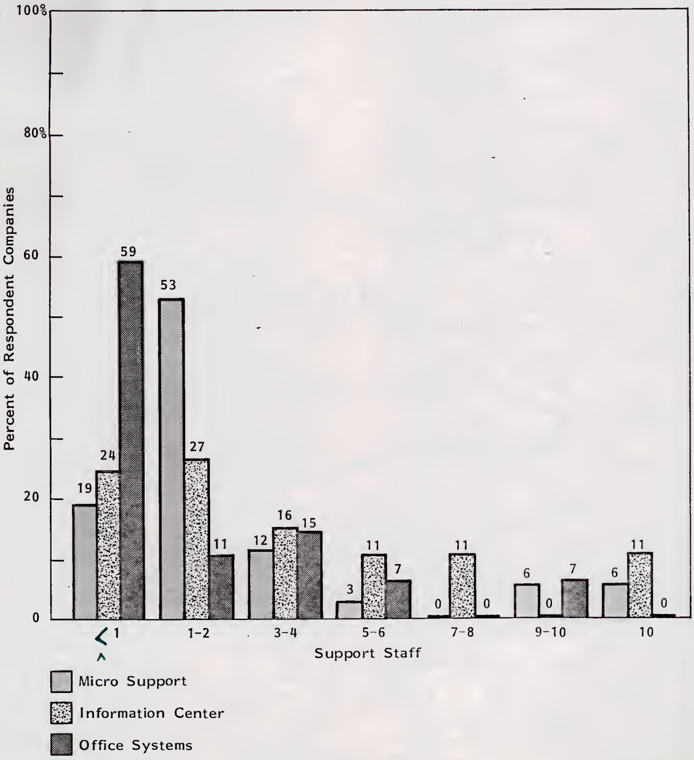
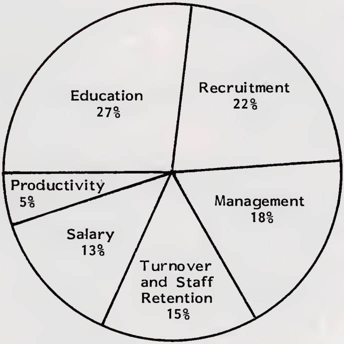


EXHIBIT V-6

## I.S. PERSONNEL PROBLEMS



Percent of Responses

EXHIBIT V-7

## I.S. END-USER COMPUTING STRATEGIES

| | |
|---|---|
| Past | Benign Neglect |
| Present | Conscientious Control |
| Future | Corporate Consciousness |

EXHIBIT VI-1

## A CORPORATE VIEW OF END-USER COMPUTING

- Solve Business Problems
- I/S-End-User Trust: A Precondition
- Optimization Hierarchy Should Be
  - Corporate
  - Departmental
  - Personal